CLAIMS

1. A digital computational circuit comprising a network made of a plurality of repetitive DNA-based conductive elements.

2. A circuit according to claim 1, wherein the DNA-based elements employ a hopping mechanism, for electron transferring between said DNA-based conductive elements, as a tunnel junction for a net charge.

3. A circuit according to claim 2, wherein said hopping mechanism comprising a P-bridge as a tunnel junction for a net charge.

4. A circuit according to claim 1, wherein the DNA-based element is a DNA Single Electron Tunneling (SET) transistor.

5. A circuit according to claim 1, comprising a DNA resistor built from a plurality of SET transistor elements in a series, with a constant over-threshold gate voltage.

6. A circuit according to claim 1, comprising a NOT gate.

7. A circuit according to claim 6, wherein the NOT gate is made of a DNA-based transistor and a resistor.

8. A circuit according to claim 7, wherein the resistor is made by using a DNA SET transistor with a constant over-threshold gate voltage, and by placing a plurality of such DNA SET transistors in series until the resistivity reaches the desired value.

9. A circuit according to claim 1, comprising a NOR gate.

10. A circuit according to claim 9, wherein the NOR gate is built from two DNA-based NOT elements, and wherein the output of the first DNA-based NOT element is connected to the resistor of the second DNA-based NOT element as its voltage supply.

11. A circuit according to claim 1, further comprising a clock.

12. A method for manufacturing a circuit consisting of a collection of basic components, said basic components being selected from transistors, logical gates, and logical operations elements and memory registers, comprising:

a) For a given basic component:

1) Synthesizing a large population of DNA strands of different types, said types comprising one continuous main strand between the source and the drain of the transistor, two complementary strands for each side, one gate strand which has, at the active edge, a short sequence which is the complementary of the main strand middle part, and a complementary strand of the gate.

2) Mixing the strands in a solution, and allowing them to combine.

3) After completion of step 2) above, adding to the solution enzymes suitable to combine to the DNA and protect the coded edges and the active cores.

4) Transforming the strands into current conductors by:

a) mutating the strands into M-DNA; or

b) implementing said strands with Poly-G Poly-C molecules.

5) Removing, by standard biochemical methods, the protecting enzymes;

b) After all the required basic elements are prepared, gradually constructing the circuit by starting at a junction in the circuit in which there is a SET transistor, and adding double stranded molecules with exposed single stranded edges complementary to the coded edges of the SET transistor.

c) Continuing construction by adding the elements, which correspond to the other edges of the wires, and adding more wire to be combine to the nuclei that have been generated until the network is completed; and

d) Adding again enzymes suitable to protect the active cores of the elements, and coating the entire circuit.